

LISTING OF CLAIMS:**BEST AVAILABLE COPY**

Claim 1: (Currently Amended) A compiler for converting source code for a program written in a programming language into object code in a machine language for a target machine, comprising:

an optimization execution unit for performing an optimization process for an object program written in a machine language for a target machine; and

a program modification unit for modifying said object program in order to absorb a ~~difference~~ differences in content between the ~~point~~ points of origin of an exception ~~process~~ processes, including both hardware and software exception processes, which ~~occurs~~ occur in response to the execution on the target machine of a ~~command~~ commands in said object program, and an exception handler whereat said exception ~~process~~ processes are performed.

Claim 2: (Original) The compiler according to claim 1, wherein, if there is a difference in content between the point of origin of an exception process, which occurs in response to the execution of a command in said object program, and a location whereat said exception process is performed, said program modification unit generates compensation code to compensate for said difference, and inserts said compensation code into said object program.

Claim 3: (Previously Presented) The compiler according to claim 1, wherein said program modification unit includes:

a pre-processor for, before said optimization execution unit performs said optimization process, employing a Try node to examine a command that may cause an exception process in

said object program to determine whether an exception process has occurred, and a Catch node for performing an inherent process when it is found an exception process has occurred; and

a post-processor for examining, in said object program that has been optimized by said optimization execution unit, said command that may cause an exception process to determine whether a difference in content exists between said command that may cause said exception process and a location whereat said exception process is performed, and for, when a difference exists, generating in said Catch node a compensation code, to be used to compensate for said difference, and a code for, after said compensation code is obtained, moving program control to said exception handler whereat said exception process is performed.

Claim 4: (Original) The compiler according to claim 1, wherein, before said optimization execution unit performs said optimization process in said object program, said program modification unit divides said command that may cause an exception process into a command portion for determining whether an exception process has occurred, and a command portion for actually causing an exception process; and wherein, when an exception process occurs, said program modification unit modifies said object program to shift program control to said command portion that actually caused said exception process.

Claim 5: (Previously Presented) The compiler according to claim 1,

wherein, when in said object program said command that may cause an exception process consists of a command portion for determining whether an exception process has occurred and a command portion for actually causing an exception process, before said optimization execution

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unit performs said optimization process, said program modification unit divides said command in said object program that may cause said exception process into said command portion for determining whether an exception process has occurred and said command portion for actually causing an exception process;

wherein, when an exception process actually occurs, said program modification unit modifies said object program in order to shift program control to said command portion that actually caused said exception process;

wherein, when an exception process has not occurred, said optimization execution unit, before performing said optimization process, establishes a Try node for examining said command that may cause an exception process to determine whether an exception process has occurred, and a Catch node for performing an inherent process when an exception process has occurred;

wherein, in said object program that has been optimized by said optimization execution unit, said program modification unit examines said command that may cause an exception process to determine whether a difference in content exists between said command that may cause said exception process and said location whereat said exception process is performed; and

wherein, when a difference exists, said program modification unit generates, in said Catch node, a compensation code for compensating for said difference and, after said compensation code is obtained, a code for moving program control to said exception handler whereat said exception process is performed.

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Claim 6: (Currently Amended) A computer system comprising a compiler for converting program source code written in a programming language into object code written in a machine language for a target machine, wherein said compiler includes:

an optimization execution unit for performing an optimization process for an object program written in a machine language for a target machine; and

a program modification unit for modifying said object program in order to absorb a ~~difference~~ differences in content between the ~~point~~ points of origin of an exception ~~process~~ processes, including both hardware and software exception processes, which ~~occurs~~ occur in response to the execution on the target machine of a ~~command~~ commands in said object program that may cause said exception process, and an exception handler whereat said exception ~~process~~ is processes are performed.

Claim 7: (Currently Amended) An optimization method for optimizing a program to increase processing efficiency on a target machine, comprising the steps of:

preparing a basic block that includes a portion for examining, in an object program, a ~~command~~ commands that may cause an exception ~~process~~ processes, including both hardware and software exception processes on the target machine to determine whether an exception process has actually occurred, and that includes a command for, when an exception ~~process has~~ processes, including both hardware and software exception processes have occurred on the target machine, moving program control to an exception handler whereat said exception ~~process is~~ processes are performed; and

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generating in said basic block compensation code, when a ~~difference~~ differences in content ~~exists~~ exist between the ~~point~~ points of origin of said exception ~~process~~ processes and said exception handler whereat said exception ~~process~~ processes are performed, for compensating for said ~~difference~~ differences.

Claim 8: (Currently Amended) An optimization method for optimizing a program to increase processing efficiency on a target machine, comprises the steps of:

establishing a basic block that includes a Try node for examining, in an object program, a ~~command~~ commands that may cause an exception ~~process~~ processes, including both hardware and software exception processes on the target machine to determine whether an exception process has occurred, and a Catch node for performing an inherent ~~process~~ processes when an exception ~~process~~ processes have occurred on the target machine;

performing optimization of said object program wherein said basic block is established;

examining said optimized object program to determine whether a ~~difference~~ differences in content ~~exists~~ exist between ~~said command~~ one of said commands that may cause an ~~one of~~ said exception ~~process~~ processes on the target machine and an exception handler whereat said one of said exception ~~process~~ processes is performed; and

generating in said Catch node of said basic block when a difference exists, a compensation code for compensating for said difference, and a code for, after said compensation code has been obtained, moving program control to said exception handler whereat said one of said exception ~~process~~ processes is performed.

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Claim 9: (Currently Amended) ~~The~~ An optimization method according to ~~claim 8~~, for optimizing a program to increase processing efficiency on a target machine, comprising the steps of:

establishing a basic block that includes a Try node for examining, in an object program, a command that may cause an exception process on the target machine to determine whether an exception process has occurred, and a Catch node for performing an inherent process when an exception process has occurred on the target machine;

performing optimization of said object program wherein said basic block is established;

examining said optimized object program to determine whether a difference in content exists between said command that may cause an exception process on the target machine and an exception handler whereat said exception process is performed; and

generating in said Catch node of said basic block when a difference exists, a compensation code for compensating for said difference, and a code for, after said compensation code has been obtained, moving program control to said exception handler whereat said exception process is performed; and

wherein said step of ~~determining~~ examining said object program to determine whether a difference in content exists between said command that may cause an exception process and said exception handler whereat said exception process is performed includes a step of:

removing said basic block prepared for said command that may cause an exception process when no difference in content exists.

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Claim 10: (Currently Amended) An optimization method for optimizing a program to increase processing efficiency on a target machine, comprising the steps of:

dividing software code, in an object program, that may cause an exception process processes, including both hardware and software exception processes on the target machine into software code for determining whether an exception process has occurred and software code for actually causing an exception process;

specifying said code obtained at said division step as branches of a control flow graph;

designing said control flow graph so that when an one of said exception process occurs processes occur on the target machine, program control is shifted to said code that actually caused said one of said exception process processes; and

performing said optimization process for said object program that has been modified.

Claim 11: (Currently Amended) ~~The~~ An optimization method ~~according to claim 10, further for~~ optimizing a program to increase processing efficiency on a target machine, comprising the steps of:

dividing software code, in an object program, that may cause an exception process on the target machine into software code for determining whether an exception process has occurred and software code for actually causing an exception process;

specifying said code obtained at said division step as branches of a control flow graph;

designing said control flow graph so that when an exception process occurs on the target machine, program control is shifted to said code that actually caused said exception process;

performing said optimization process for said object program that has been modified;

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determining whether code for compensating for a difference in content between the point of origin of an exception process and code for actually causing said exception process have been generated in a block that includes code for the actual performance of said exception process after the optimization process has been run; and

using said control flow graphs, when said code for compensating for said content difference is not generated, for synthesizing said two code sets to obtain said code arrangement that existed before said code was divided.

Claim 12: (Currently Amended) A computer program that permits a computer to optimize an object program on a target machine, comprising:

a process for preparing a basic block that includes a portion for examining ~~a command~~ commands, in an object program, that may cause an exception ~~process~~ processes, including both hardware and software exception processes on the target machine, in order to determine whether an exception process has occurred on the target machine, and that includes a command for, when ~~an~~ one of said exception ~~process~~ processes has occurred, moving program control to an exception handler whereat said one of said exception processes is performed; and

a process for, when a difference in content exists between the point of origin of said one of said exception ~~process~~ processes on the target machine and said exception handler whereat said one of said exception processes is performed, generating in said basic block compensation code for compensating for said difference.

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Claim 13: (Currently Amended) A computer executable program comprising:

a function for examining ~~a-command~~ commands, in said computer program, that may cause ~~an exception process~~ processes, including both hardware and software exception processes on a target machine, to determine whether an exception process has occurred;

a function for running an exception process; and

a function for, when an exception process has occurred on the target machine, shifting program control to an exception handler whereat said exception process is run, and for, when a difference in content exists between the point of origin of said exception process on the target machine and said exception handler whereat said exception process is run, compensating for said difference before program control is shifted to said exception handler whereat said exception process is run.

Claim 14: (Original) The computer executable program according to claim 13, wherein said function for determining whether an exception process has occurred is provided by a Try node of a Try-Catch block or by a condition branch.

Claim 15: (Currently Amended) A storage medium, on which input means of a computer stores a computer-readable program that permits said computer to perform:

a process for preparing a basic block that includes a portion for examining ~~a-command~~ commands, in an object program, that may cause ~~an exception process~~ processes, including both hardware and software exception processes on a target machine, in order to determine whether an exception process has occurred, and that includes a command for, when ~~an~~ one of said

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exception ~~process~~ processes has occurred on the target machine, moving program control to an exception handler whereat said one of said exception ~~process~~ processes is performed; and

a process for, when a difference in content exists between the point of origin of said one of said exception ~~process~~ processes on the target machine and said exception handler whereat said one of said exception ~~process~~ processes is performed, generating in said basic block compensation code for compensating for said difference.

Claim 16: (Currently Amended) A program transmission apparatus comprising:

storage means for storing a program that permits a computer to perform

a process for preparing a basic block that includes a portion for examining ~~a command~~ commands, in an object program, that may cause ~~an exception process~~ exception processes, including both hardware and software exception processes on a target machine, in order to determine whether an exception process has occurred on the target machine, and that includes a command for, when one of said ~~an exception process~~ processes has occurred, moving program control to an exception handler whereat said one of said exception ~~process~~ processes is performed, and

a process for, when a difference in content exists between the point of origin of said one of said exception ~~process~~ processes on the target machine and said exception handler whereat said one of said exception ~~process~~ processes is performed, generating in said basic block compensation code for compensating for said difference; and

transmission means for reading said program from said storage means and for transmitting said program.

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Claim 17: (Previously Presented) A compiler according to Claim 3, wherein the post-processor registers an address of the point at which the exception process occurs.

Claim 18: (Previously Presented) A compiler according to Claim 17, wherein the post-processor registers an address of the exception handler.